

CLAIMS:

1. A gas discharge source, in particular for generating extreme ultraviolet and/or soft X-radiation, in which a gas-filled intermediate electrode space (3) is located between two electrodes (1, 2), in which devices for the admission and evacuation of gas are present, and in which one electrode (1) exhibits an opening (5) that defines an axis of symmetry (4) and is provided for the discharge of radiation, characterized in that a diaphragm (6), which exhibits at least one opening (7) on the axis of symmetry (4) and operates as a differential pump stage, is present between the two electrodes (1, 2).

2. A gas discharge source as claimed in claim 1, characterized in that the gas pressure in the part-area of the gas-filled intermediate electrode space (3) defined by the diaphragm (6) and the electrode (2) that faces away from the discharge side of the radiation is greater than in the part-area of the gas-filled intermediate electrode space (3) defined by the diaphragm (6) and the electrode (1) that faces towards the discharge side of the radiation.

3. A gas discharge source as claimed in any one of the preceding claims, characterized in that the diaphragm (6) is designed in such a way that it contributes to the current transfer to only a small extent at the most.

4. A gas discharge source as claimed in any one of the preceding claims, characterized in that at least a portion of the diaphragm (6) comprises a material that is amenable to machining and/or a material with a high thermal conductivity.

5. A gas discharge source as claimed in any one of the preceding claims, characterized in that at least a portion of the diaphragm (6) comprises ceramics.

6. A gas discharge source as claimed in any one of the preceding claims, characterized in that the diaphragm (6) comprises a discharge-resistant material, at least in an area (10) close to its opening (7).

7. A gas discharge source as claimed in any one of claims 1 to 4, characterized in that multiple metallic diaphragms (6, 6', 6''), separated from one another by isolators (11), are present.

5 8. A gas discharge source as claimed in any one of the preceding claims, characterized in that, in the direction of the axis of symmetry (4), the diaphragm (6) extends to between 1 mm and 20 mm.

9. A gas discharge source as claimed in any one of the preceding claims,
10 characterized in that the opening (7) of the diaphragm (6) has a diameter between 4 mm and 20 mm.

10. A gas discharge source as claimed in any one of the preceding claims,
characterized in that gas inlets are present with openings facing towards the part-area of the
15 gas-filled intermediate electrode space (3) defined by the diaphragm (6) and by the electrode (2) facing away from the discharge side of the radiation.

11. A gas discharge source as claimed in any one of the preceding claims,
characterized in that gas inlets are present with openings facing towards the part-area of the
20 gas-filled intermediate electrode space (3) defined by the diaphragm (6) and by the electrode (1) facing towards the discharge side of the radiation.

12. A gas discharge source as claimed in any one of the preceding claims,
characterized in that the electrode (2) facing away from the discharge side of the radiation is
25 equipped with a cavity (8), which exhibits at least one opening (9) to the gas-filled intermediate electrode space (3).

13. A gas discharge source as claimed in any one of the preceding claims,
characterized in that a gas inlet is present with an opening to the cavity (8) in the electrode
30 (2) facing away from the discharge side of the radiation.

14. A gas discharge source as claimed in either one of claims 12 or 13,
characterized in that a triggering device may be present in the cavity (8) of the electrode (2)
facing away from the discharge side of the radiation.

15. A gas discharge source as claimed in any one of the preceding claims,
characterized in that the gas mixture in the intermediate electrode space (3) comprises a
working gas used for the gas discharge and, in addition, at least one further filler gas, which,
5 by comparison with the working gas, exhibits lower radiation losses.

16. A gas discharge source as claimed in any one of the preceding claims,
characterized in that it is mainly the working gas that is contained in the gas mixture in the
part-area of the gas-filled intermediate electrode space (3) defined by the diaphragm (6) and
10 by the electrode (1) facing towards the discharge side of the radiation, and it is mainly the
filler gas that is contained in the gas mixture in the part-area of the gas-filled intermediate
electrode space (3) defined by the diaphragm (6) and by the electrode (2) facing away from
the discharge side of the radiation.

15 17. A gas discharge source as claimed in any one of the preceding claims,
characterized in that the evacuation of the intermediate electrode space (3) takes place
through the opening (5) of the electrode (1) facing towards the discharge side of the radiation.

18. A gas discharge source as claimed in any one of the preceding claims,
20 characterized in that the electrode (2) facing away from the discharge side of the radiation is
used as the cathode.

19. A gas discharge source as claimed in any one of the preceding claims,
characterized in that the electrode spacing and the gas pressure between the electrodes are
25 selected such that the gas discharge takes place on the left branch of the Paschen curve.